

Ecological and phytogeographical differentiation of beech forests in Greek Rodopi (Northeast Greece)

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Abstract: Beech forests (*Fagus sylvatica* L. s.l.) of the Greek Rodopi mountain range were studied using the method of Braun-Blanquet. The present study is based on the multivariate analysis (TWINSPAN and Detrended Correspondence Analysis) of 614 relevés and it aims at investigating the ecological and phytogeographical differentiation of beech forests in Rodopi mountain range. Four ecological units were distinguished: the mesophilous, acidophilous, calcareous and thermophilous beech forests. The interpretation of the relevé table and the ordination diagram revealed that floristic differentiation is the result mainly of ecological factors, such as water supply, temperature, soil fertility, and geological substrate. Chorological spectra were constructed for each ecological unit in which the most important difference was a higher percentage of sub-mediterranean species in the calcareous and thermophilous forests. The ecological units were treated syn-systematically and classified into *Fagetalia sylvaticae*, including the thermophilous forests.

Key words: classification detrended correspondence analysis, chorology, syntaxonomy, TWINSPAN, and vegetation.

Introduction

Beech is one of the major forest species in the Greek Rodopi mountain range. It forms pure stands and mixed ones mainly with *Picea abies* ssp. *abies*, *Pinus sylvestris*, *P. nigra* ssp. *nigra* and *Quercus petraea* ssp. *medwediewii*.

Although studies concerning plant communities of beech forests in the Balkan peninsula have been published recently (BERGMEIER & DIMOPOULOS, 1999; DZWONKO et al., 1999; DZWONKO & LOSTER, 2000; BERGMEIER & DIMOPOULOS, 2001) there is still lack of knowledge on the vegetation units of beech forests in southeast Balkans. Very few relevés have been conducted so far, especially in Greek Rodopi. Therefore the vegetation units of the beech forests in this area can be regarded as not well known.

In the past, the classification of plant communities of beech forests in higher syntaxa was based on two kinds of criteria, the ecological and phytogeographical (DIERSCHKE, 1998). TÖRÖK et al. (1989) found that the classification of the Illyrian beech forests indicates a clear geographical differentiation. Comparison of beech communities in a wide geographical area (macro-scale level) is expected to reflect a clear phytogeographical pattern, but in rather smaller areas (meso-scale level) ecological differences will probably be more responsible for the differentiation of plant communities.

This study deals with the ecological and phytogeographical differentiation of the beech forests in Greek Rodopi with respect to factors causing the floristic differentiation. It also deals with some syntaxonomical aspects of the beech forests in the studied area.

Study area

The Rodopi mountain range is located in northeast Greece extending from west to east, along the Greek-Bulgarian border. The Greek part of the Rodopi is bound by the Nestos river on the west and south side, while eastwards it gradually declines in elevation to the Evros plains. The research area lies between 41°10' to 41°34' N latitude and 24°13' to 25°53' E longitude and it extends over the prefectures of Drama, Xanthi and Rodopi (Fig. 1).

Pure beech stands as well as mixed ones in which beech was the dominant tree species, were investigated. In Xanthi prefecture beech reaches its lower altitudinal limit in Greece, which is 180 m (MOULOPOULOS, 1965). Our relevés were conducted between the altitudes of 340 and 1780 m. In the west part of the study area, beech forests occur mainly above 800 m altitude, but in the east part, most of them occur between 500 and 1000 m altitude. Based on the above altitudinal differentiation of beech forests as well as on beech morphological variation, the study area can be divided in two parts, the west and the east part. The ridge of Koula can be considered as the border between these two parts.

The study of the climate in the research area was based on data from seven meteorological stations, although only